Less Fizzy Drinks: A Multi-method Study of Persuasive Reminders

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Abstract. In this paper, we present initial outcomes from our multi-method study that explored the impact of reminders on effectiveness of information systems that aim to facilitate behaviour change. Our study explicitly focused on reminders as a key persuasive software feature that should be employed to support behaviour change. We designed a prototype aiming to encourage people to gradually reduce soda/fizzy drinks consumption. A multi-method 14-day pilot study was conducted, composed of statistical analysis followed by a qualitative focus group. Statistical analysis shows that participants consumed less fizzy drinks in the second half of the study, and feedback from the focus group study indicates that reminders successfully persuaded participants to keep a log of their fizzy drink consumption. Our study supports the claim that persuasive reminders have extraordinary potential for helping people change their behaviours.

Keywords: Behaviour change, persuasive systems design, persuasive features, reminders.

1 Introduction

Consumption of fizzy (soft) drinks such as soda and cola instead of water has become a common habit. Fizzy drinks are high in sugar, calories and addictive ingredients and possess little or no dietary value. Such drinks contain phosphoric acid, sugar, caffeine and other harmful ingredients. Soft drinks (both fizzy and soda) result in weight gain, which in turn leads to an increased risk of diabetes.[1] Another side effect of such drinks is weakening of bones and higher risk of osteoporosis.[2] Despite all of this publicly available information, it is evident that people do not view fizzy drinks consumption as habit with negative health effects. We developed a web-based persuasive prototype (system) that aimed to support people in reducing fizzy drinks consumption.

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[1] www.emedexpert.com/tips/soft-drinks.shtml. Accessed on 28-12-2011.

[2] www.nhs.uk/news/2009/05May/Pages/ColaSapsMuscleStrength.aspx. Accessed on 29-12-2011.

Persuasive systems can be defined as "computerized software or information systems designed to change or shape attitudes or behaviours or both without using coercion or deception" [1]. Several factors may hinder performance of the desired behaviour. These may be linked to motivation, ability, resources, time, or reminders [2], which belong to the key persuasive software features in behaviour change technologies [3]. Reminders been employed in scores of studies aiming to promote healthy living; for instance, Fry and Neff [4] argue that intervallic reminders are efficient in behaviour change technologies, while Fjeldsoe et al. [5] argue that reminders delivered via short message service have a positive effect on behaviour change. Bickmore et al. [6] argue that an insistent and obtrusive reminder might well be effective in the short run, but the effect reduces significantly over time. On the other hand, if the reminders are polite, there is a likelihood that little or no compliance would occur in the early stages; however, users are more likely to use the device over the long run. Walji and Zhang [7] employed human-centred design principles to develop persuasive reminders that were intended to encourage people (patients) to be present at their allocated appointment. They argue that user-centred design approach proved to be valuable and helped them make several modifications to their appointment reminder system.

This paper seeks to investigate the impact of reminders in persuasive systems. The aim is to analyse in what way and to what extent reminders help users perform desired behaviours. The paper presents the findings of a 14-day pilot study followed by outcomes of a focus group that was conducted at the University of Oulu, Finland.

2   Theoretical Viewpoint

To design and develop our prototype by employing a framework that outlines fundamental persuasive features, we expended the Persuasive Systems Design (PSD) Model put forward by Oinas-Kukkonen and Harjumaa [3]. The PSD Model encourages thorough analysis of the context of a persuasive attempt, i.e. the intent, the event and the persuasive approach adopted. Further, it signifies the importance of identifying key contents and software functionalities for designing and developing persuasive systems. It supports a comprehensive consideration of persuasive features during the design process of a persuasive system, and provides a foundation for a feature-by-feature evaluation of a persuasive system. The PSD Model outlines four distinct categories of persuasive features. These categories are: 1) Primary Task Support (aimed at supporting users' primary tasks), 2) Dialogue Support (aimed at helping users reach their goals), 3) System Credibility (aimed at improving system credibility) and 4) Social Support (aimed at enhancing users' motivation through social influence).

3   Research Setting

3.1   Participants and Recruitment

The participation was required to be on a volunteer basis and consisted only of those who consumed one or more fizzy drinks on an average day and were willing to reduce

fizzy drinks consumption. For the purpose of recruitment, we sent out e-mails to the Department of Information Processing Science at the University of Oulu, Finland. In addition, we visited some classrooms and explained the study. Following this, 29 participants were enrolled for the pilot study. Eight females (27.6%) and 21 males (78.4%) with a minimum age of 22 and maximum age of 34 years volunteered to participate. To compensate their participation, a lucky draw (€50 Amazon Gift Voucher) was organised for one winner at the end of the study.

3.2   About the Less Fizzy Drinks System

All the registered participants were sent a "welcome" e-mail along with a URL to the system's registration page. Using their e-mails as unique user ID, they were required to fill out a form providing information about their age, gender, education, profession, weight, telephone number and average consumption of fizzy drinks. An activation link was auto-generated and sent to the participant's e-mail upon completion of registration. On the first day of their interaction with the prototype, users recorded their average fizzy drinks consumption as well as their current weight. For the remaining days, they received a daily reminder through e-mail at 9 a.m. prompting them to record their fizzy drinks consumption for the day before. This was to ensure that they did not miss out on any fizzy drinks intake that they might consume after having recorded their daily consumption. Users were also required to record their weight two times during the 14-day interaction with the system, i.e. day 7 and day 14. Two separate reminders were sent out to the participants regarding this, one on day 7 and the second on day 14. Similar to the daily reminders, the weight update reminders were e-mail-based, promoting the participants to update their weight. Each time a user recorded fizzy drinks consumption, the system responded with immediate feedback. The content of the feedback depended on the amount of recorded fizzy drinks consumption. For example, when a participant recorded a reduced number of drinks, praise was instantly prompted. For example, *"Well done. You are successfully reducing your fizzy drinks intake."* Or when a participant recorded the same amount of fizzy drinks intake as the day before, the system prompted, *"Your fizzy drinks intake is the same as yesterday."*

3.3   Post-Study Focus Group

Following the 14-day pilot study, users were invited to be part of a focus group. Thirteen (n=13) volunteered to participate. A 30-minute focus group was conducted during which they were served refreshments. With their consent, the discussion was audio recorded.

4   Results

4.1   Statistical Analysis

We wanted to examine whether the users adhered to a routine of updating their drink consumption record upon receiving daily reminders: It was our hypothesis that the

effect of the reminders would be such that the users would keep updating their drink consumption log. Further, we wanted to detect any change in the amount of fizzy drink consumption during the pilot study; detecting even a slight change in consumption was considered as an indicative factor for a possible behaviour change in future work. The results in terms of task adherence relating to reminders (to update drink consumption record) were staggering, as all the participants (N=29; 100%) updated their records for the entire study period. We acknowledge the small sample size and short study duration, in which users were not required to perform time-consuming tasks. However, the fact that all the users responded positively to the reminders is a promising finding and cannot be overlooked.

For the purpose of descriptive statistical analysis, we decided to split the data into two halves, i.e. average drink consumption for the first seven days and the last seven days. A paired-sample T-test was conducted to compare the average drink consumption in Week 1 (Condition 1) and Week 2 (Condition 2). Results from T-tests indicate that there was a significant difference between mean of average soda drinks consumption for Week 1 (M=4.89, SD=4.64) and Week 2 (M=2.27, SD=2.98). The results from the Paired Differences between Week 1 and 2 with a confidence interval of 95% and Sig. (2-tailed) value of (p=0.003) suggest that persuasive reminders helped users conform to the subtask of recording their intake.

We interpret these results in such a manner that there was a positive effect of our system on the participants. Specifically, after users' interaction with the prototype for the first week, there was a noticeable reduction in soda drinks consumption. However, given the limited scope of the study, it cannot be claimed that the reduction of fizzy drinks consumption was as a consequence of the persuasive reminders only. However, the significant reduction in mean value (M=2.62) encourages us to argue that further improvement to the prototype and a field study may reveal more in-depth results.

4.2   Focus Group Results

A focus group was conducted to gather users' insight and feedback on about the effectiveness of the reminders and overall perceived persuasiveness of the software features. We opted for a focus group because they are similar in nature to individual interviews [7]; however, the concurrent participation stimulates a more in depth discussion in the presence of a facilitator. Participants of the focus group were asked about their evaluation of reminders that they received during their interaction with the system. It was stipulated that they should keep in mind the content, frequency and timing of the reminders while commenting. All the (n=13,100%) participants highly approved the reminders and gave encouraging feedback. There were some worthy comments about the timing and frequency of the reminders during the discussion. The general consensus amongst the participants was that in such a study, one reminder a day is ample. Participants were then asked to give their opinion and feedback regarding the timing of the reminders. A high majority of the participants (n=12) expressed positive remarks about the timing of the reminders. In response to whether

the reminders were useful, all the participants gave positive remarks about the effectiveness of the reminders. Some of the representative comments (C) are listed below:

C1: "I would say that the reminders were well (good) because when I check my e-mail in the morning, it was the first thing that I did. It (the procedure) was really simple. You go in there (to the e-mail) and one click will take you to the system. It would take fifteen seconds to complete the task. So they (reminders) worked well"." (Male, Graduate student)

C2: "I think reminders were good. For the first two times (days), I used the reminders. But from the third day, I recorded my (fizzy drinks) consumption unconsciously." (Male, Web designer)

C3: "The system helped me a lot because I am more driven by reminders." (Male, UI designer)

C4: "I go to the system after receiving the reminders because now I can trust that I am being reminded and I do not need to remember (by myself)." (Female, Graduate student)

5   Discussion

The statistical analysis from the study indicates that the reminders were successful in motivating users to regularly update their fizzy drink consumption. Further, a significant reduction in consumption is observed. Participants of the focus group showed a prodigious approval of the reminders' persuadability. They were perceived as simple, on time and facilitating use of the system. Interestingly, none of the participants reported being irritated by the frequent (daily) reminders. The prototype proved to be robust enough for the pilot study. Based on the data analysis and feedback received from the users, we intend to make amendments to the prototype both in terms of usability and additional persuasive features.

Our study was prone to several limitations. First, the sample size was not large enough to generalise results. Second, the subjects of the study do not represent the broader population, especially those who consume fizzy drinks heavily. Further, for the pilot stage we did not have a control group that had the same intervention without reminders. Nevertheless, the mixed-method approach provided an in-depth insight to our study. We therefore argue that the discipline of persuasive systems has reached a stage where multi-method studies could lead to better designing and implementation. User participation in the design process can enhance the effectiveness of persuasive systems strategies and features.

6   Conclusions

We investigated the scope of persuasive reminders to encourage users to reduce fizzy drink consumption. It was found that reminders served the purpose of persuading people to record their daily fizzy drink intake. All of the users adhered to a routine of

recording their fizzy drinks consumption for the entire duration of the study. We argue that this is a promising finding.

The focus group discussion highlighted useful ideas that will be utilised to further refine the prototype. Various themes emerged from the discussion in the focus group that covered different aspects of designing persuasive systems. From the findings (quantitative and qualitative) of the study, we can safely argue that reminders are an essential part of any given persuasive system. Our study presents a blend of quantitative and qualitative methodologies. It offers openings for further research where valuables insights could be achieved beyond quantitative data.

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